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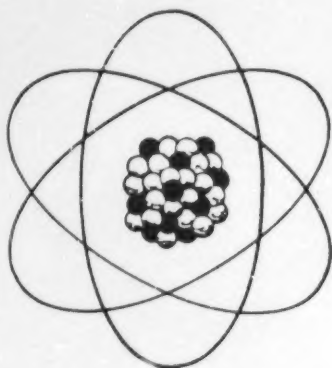
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ABSTRACT

This tenth in a series of ten modules for a course titled Welding Inspection describes records associated with welding which serve three functions: specification of agreements, initiation of action in fulfillment of agreement, and historical evidence of action taken. The module follows a typical format that includes the following sections: (1) introduction, (2) module prerequisites, (3) objectives, (4) notes to instructor/student, (5) subject matter, (6) materials needed, (7) procedures, (8) data table, (9) reference materials, (10) test. (The course is one of fifteen technical courses for the second year of a two-year postsecondary curriculum in Nuclear Quality Assurance/Quality Control Technology.) (LRA)

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COURSE 28 WELDING INSPECTION

MODULE 28-10 Records



GENERAL PHYSICS CORPORATION
Columbia, Maryland

CE 024 2570



COURSE MODULES

COURSE 28 WELDING INSPECTION

Module 28-1	Welding Fundamentals and Processes
Module 28-2	Shielded Metal Arc and Oxyacetylene Welding
Module 28-3	Tungsten Inert Gas (TIG), Metal Inert Gas (MIG) and Submerged Arc Welding
Module 28-4	Weld Joint Verification
Module 28-5	Qualifications
Module 28-6	Process Controls
Module 28-7	Acceptance Inspection
Module 28-8	Filler Metal Control
Module 28-9	Weld Repair Control
 Module 28-10	Records

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This module was prepared for General Physics Corporation by John Espy of General Physics Corporation.



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1979



INTRODUCTION

Records have an important role in all facets of industry. While records are sometimes viewed as a "necessary evil", certain records are essential and beneficial. In general, records serve three important functions:

- Specification of Agreements
- Initiation of Action in Fulfillment of Agreement
- Historical Evidence of Action Taken

These three basic roles of records are easily illustrated by a personal checking account with a financial institution. When a person opens a checking account, he or she must sign a statement of understanding of the rules governing such account. This record specifies the agreements made by the person and the institution. When the person issues a check against the account, the check itself initiates all action in fulfillment of the agreements. At each step, the action party adds an entry on the check until the person's account is docked the amount of the check which completes all agreements. Both the check and the periodic statement of account transactions give historical evidence of actions taken.

If one imagines what transpires at each step it is not difficult to recognize that a number of additional records are generated because of the check. The payee probably recorded receipt and subsequent deposits of the funds. Each involved financial institution recorded receipt and transfer of the funds in accordance with inter-banking agreements. Finally, the institution holding the account not only recorded receipt and transfer but also issued a periodic statement. If these additional records are viewed from the perspective of the organization which generated them, the same three basic roles are served.

But aren't there other records? For example, did the payer make entries on the check stub or chronological listing of issued checks? Is the value of this record merely convenience or is it necessary to properly manage the function of issuing checks? Both the value and the necessity of such "fringe" records are best judged in terms of whether they directly support one of the three basic functions of records without unnecessary duplication.

This module describes records associated with welding which fulfill the three basic roles of records. Because the most stringent requirements for welding records are stipulated by the ASME Boiler and Pressure Vessel Code, this module describes records associated with welding governed by this code. Other welding codes require similar records but not necessarily to the same extent.



MODULE PREREQUISITES

The student/trainee shall have completed all previous modules in Course 28.



OBJECTIVES

Upon completion of this module, the student/trainee shall be able to do the following:

1. Name two types of documents which describe the welding records to be maintained by any company performing welding.

2. Differentiate the purposes of documents, procedures and record forms.
3. Name three characteristics of records which represent record quality and discuss each in terms of factors which contribute to record quality.
4. Given any of the following records, state its purpose and describe how it is identifiable:
 - a. Procedure Qualification Records
 - b. Welder and Welding Operator Performance Qualification Record
 - c. Nondestructive Examination Procedure Demonstration Record
 - d. Nondestructive Examination Personnel Certification Record
 - e. Certified Material Test Report
 - f. Weld Joint Record
 - g. Nondestructive Examination Report
5. Given any of the records listed in #4 above, state two tasks which may be assigned to the Nuclear QA/QC Technician with respect to the record.
6. Name the records associated with welding which are forwarded with data reports to the owner of the nuclear power plant.



SUBJECT MATTER

REQUIRED WELDING RECORDS

Sources Which Require Welding Records

The initial source of requirements for welding records applicable to nuclear power plant activities in the U.S. Code of Federal Regulations (CFR). The U.S. Nuclear Regulatory Commission (NRC) issues regulations within Title 10 of the CFR. NRC has promulgated, via Appendix B to 10 CFR Part 50, eighteen quality assurance criteria to be met in the design, manufacture, installation, test and operation of a nuclear power plant. A company's Quality Assurance Manual must satisfy these criteria. The criterion on records applies to all quality assurance records, including welding records. This criterion is quoted below:

XVII. Quality Assurance Records

Sufficient records shall be maintained to furnish evidence of activities affecting quality. The records shall include at least the following: operating logs and the result of reviews, inspections, tests, audits, monitoring of work performance, and materials analyses. The records shall also include closely-related data such as qualifications personnel, procedures, and equipment. Inspection and test records shall, as a minimum, identify the inspector or data recorder, the type of observation, the results, the acceptability, and the action taken in connection with any deficiencies noted. Records shall be identified and retrievable. Consistent with applicable regulatory requirements, the applicant shall establish requirements concerning record retention, such as duration, location and assigned responsibility.

State regulatory agencies and the U.S. Nuclear Regulatory Commission have applied the ASME Boiler and Pressure Vessel Code to welding activities involving pressure boundary parts, components and systems. This Code requires the development of quality assurance policies and procedures which delineate, among other things, the records to be employed for welding activities. It also specifies certain specific welding records which must be included. Many of these same specific welding records are also required by AWS Structural Welding Code. Therefore, requirements for welding records are contained in two documents:

- Company Quality Assurance Manual
- Applicable Welding Code

Scope of Required Records

Welding records include documents, procedures, and record forms. In general, documents specify requirements to be met by welding operations; procedures describe responsibilities, duties, and methods of accomplishing welding operations; both procedures and record forms provide evidence of how welding operations were performed; and record forms attest to the quality of welds and qualification of procedures and personnel. These records are listed in Table 28-10-1.

TABLE 28-10-1, WELDING RECORDS

RECORD	TYPE ⁽¹⁾	PURPOSE WITH RESPECT TO WELDING
Design or Installation Specification	D	Specifies Applicable Welding Code and Materials
Design or Installation Drawings	D	Specifies Weld Joint Types and Unique Welding Requirements
Detail Manufacturing or Installation Drawings	D	Specifies Weld Joint Preparation and Unique Welding Requirements
Welding Procedure Specification (WPS)	P	Describes How Welding is to be Accomplished
Heat Treatment Procedure	P	Describes How Post Weld Heat Treatment is to be Accomplished
Nondestructive Examination Procedures (RT, MT, PT, UT)	P	Describes How Nondestructive Examinations are to be Accomplished
Sequential Manufacturing or Installation Instructions (Job Package) ⁽²⁾	P	Describes the Specific Procedures and Records Applicable to Specific Weld Joints
Procedure Qualification Record (PQR)	R	Provides Evidence of Satisfactory Qualification of Welding Procedure Specifications
Welder and Welding Operator Performance Qualification Record	R	Provides Evidence of Satisfactory Welder Qualification
Nondestructive Examination Personnel Certification Record	R	Provide Evidence of Satisfactory NDE Personnel Qualification
Certified Material Test Report	R	Provides Evidence of Acceptable Filler Material
Welder and Welding Operator Stamps ⁽³⁾ or Weld Joint Record	R	Provides Evidence of Who Made the Weld

TABLE 28-10-1, WELDING RECORDS (continued)

RECORD	TYPE ⁽¹⁾	PURPOSE WITH RESPECT TO WELDING
NDE Inspection Reports	R	Provides Evidence of Examination and Acceptance of the Weld and by Whom
Other Procedures and Records	P,R	Describe Responsibilities and Duties for Carrying Out Welding Operations; Provides Evidence of Implementation of Such Responsibilities and Duties, Including Monitoring Monitoring and Auditing Activities

Notes: (1) Type: D = Document, P = Procedure, R = Record Form

(2) Sequential manufacturing or installation instructions may not be classified as a record if a weld joint history record is used and contains sufficient entries to identify the WPS, the welder, heat treat procedure and NDE procedure.

(3) Weld joint history records may not be used if the "job package" is treated as a record and the weld is stamped by the welder and NDE personnel.

END

QUALITY CHARACTERISTICS OF RECORDS

Quality of records pertains to the time period of record generation and use and to the time period of record storage for historical purposes. Only the first time period is of concern at this point since record storage systems are beyond the scope of this module.

Welding records have satisfactory quality if they are identifiable, legible, and complete. Factors involved with each of these characteristics are described as follows:

- Identifiable. Identification of records is always in terms of the item represented by the record. The record identifies which product or person is governed or represented by the record. Documents and Procedures exhibit this characteristic by their title, statement of scope or purpose, identification number and revision number. Such identification associates the document or procedure with the type of product or population of people but not necessarily with a given unit of that type or specific individual within the population. For example, "Design Specification for Main Coolant Pumps, MCP-1, Revision 1," identifies the type of pump being governed by the document but does not identify each pump of that type. Instead, the document applies to all pumps of that type. Record forms are identifiable not only to types but also to specific entities within a type. Unit identification is provided by heat, lot, or control number; part number; part serial number; component serial number; system identification number; and personnel identification name or number. Examples of each are as follows:

- Heat, Lot, or Control Number - is entered on records which represent materials. Example: The Certified Material Test Report and the receiving inspection record for a given classification of filler material are identifiable to the product by heat, lot, or control number of the material.
- Part Number - is entered along with a lot number or quantity on records which represent parts and sub-assemblies. Example: Records of a weld repair of a part are identifiable to the product by part number.
- Part Serial Number - is entered along with part number on records which represent serialized parts and subassemblies. Applicable technical specifications require serialization of parts and sub-assemblies when each individual unit must be traceable to all processing steps. Example: Records of a weld repair of a serialized part are identifiable to the product by part number and serial number.
- Component Serial Number - is entered along with component name and weld joint identification on records which represent the specific component. Example: Radiographic examination for reactor vessel serial number A-106 inlet nozzle B to elliptical head weld is identifiable to the product by the component serial number.
- System Identification Number - is entered along with component serial numbers and weld joint identification on records which represent system installation, modification, or repair. Example: Radiographic examination report for system CWS-1, pipe to pump nozzle weld joint, is identifiable to the product by the same number.

- Personnel Identification - is entered on all records. If the record represents product, the person's name or number represents who performed the activity on the product. If the record represents people, both the person represented and the person making the entries are recorded. Example: Personnel qualification record for employee granted by employee B is identifiable by names or numbers to both persons.
- Legible - Legibility provides for readability and understanding. Factors which provide for legibility are:
 - Neatness - Not only legible entries but also placement of the entries is important, i.e., can the entry be read in association with its purpose?
 - Control of Corrections - Erroneous entries invariably occur from time to time. Their correction either degrades or maintains legibility of the record. The best practice is to prohibit erasures and to require a single line through the erroneous data, entry of correct data, and initial of the person making the correction.
- Complete - Completeness means entry of all required data and entries in every block of record forms. It supports accuracy and validity of records. For each type of record, it is best to have a procedure which identifies the minimum required data entries. A typical procedure requires entry of product identifiers, results of the activity represented by the record, acceptance or rejection of such results, identification of person(s) performing the activity and completing the record, and date. Record forms are frequently planned to be useable for various, similar

activities. For this reason, some portions of a form may not require data entries for a given activity. In such instances, it is best to require entry of "not applicable" to avoid the appearance of an incomplete record.

SPECIFIC RECORDS

Other modules of this course describe the documents and procedures which also serve as welding records. Therefore, this section is limited to specific welding record forms which are required by the ASME Boiler and Pressure Vessel Code (referred to hereafter as the Code). These record forms are those listed previously in Table 28-10-1.

Procedure Qualification Record

As described by Module 29-5, welding procedure specifications (WPS) are prepared and qualified for each welding process and "set" of essential variables. Documentation of the qualification of a WPS is on the Procedure Qualification Record (PQR).

Every WPS is supported by a PQR although a given PQR may suffice for more than one WPS. When two or more WPS exist for the same welding process, only one PQR is necessary if the differences among the procedures do not involve different essential variables. For this reason, most companies maintain a supplementary record which lists each WPS number and its supporting PQR number. This listing is useful in preparing processing instructions for a particular job because it provides evidence that the WPS intended for use on the job either is or is not already qualified.

Each PQR is assigned a unique serial number which permits easy identification and retrieval of the record. The

PQR also contains entry of each WPS number supported by the PQR. Since each WPS bears the serial number of its supporting PQR, a complete cross reference is maintained between procedure and its qualification record.

Entries on the PQR represent the actual data for welding a qualification test piece, examining and testing the test piece, and accepting the results of examinations and tests. The entries may be made directly on the PQR by the persons performing each activity or a designated person may make all the entries by transposing values from other supporting records. In the latter instance, the separate supporting records consist of welding data reports, nondestructive examination reports, and destructive test reports. Such individual records are forwarded to the designated person who prepares the PQR. This approach is typically used by companies having large numbers of on-going qualifications.

The Nuclear QA/QC Technician may be assigned any of the following task with respect to the PQR:

- Observe the qualification welding and make all welding data entries.
- Review PQR for completeness and compliance with the Code.
- Prepare and maintain a listing which cross references each WPS with its PQR.
- Monitor or audit the PQR program.
- Monitor or audit welding operators to determine that a WPS in use is supported by a proper PQR.

The PQR format recommended by the Code is shown in Figure 28-10-1 on the next two pages.

QW-483 PROCEDURE QUALIFICATION RECORD (PQR)
(See QW 201.2, Section IX, 1974 ASME Boiler and Pressure Vessel Code)

Company Name _____
 Procedure Qualification Record No. _____ Date _____
 WPS No. _____
 Welding Process(es) _____
 Types (Manual Automatic Semi Auto) _____

JOINTS (QW-402)

Groove Design Used

BASE METALS (QW-403)

Material Spec _____
 Type or Grade _____
 P No. _____ to P No. _____
 Thickness _____
 Diameter _____
 Other _____

POSTWELD HEAT TREATMENT (QW-407)

Temperature _____
 Time _____
 Other _____

FILLER METALS (QW-404)

Weld Metal Analysis A No. _____
 Size of Electrode _____
 Filler Metal F No. _____
 SFA Specification _____
 AWS Classification _____
 Other _____

GAS (QW-408)

Type of Gas or Gases _____
 Composition of Gas Mixture _____
 Other _____

ELECTRICAL CHARACTERISTICS (QW-409)

Current _____
 Polarity _____
 Amps _____ Volts _____
 Other _____

POSITION (QW-405)

Position of Groove _____
 Weld Progression (Uphill Downhill) _____
 Other _____

TECHNIQUE (QW-410)

Travel Speed _____
 String or Weave Bead _____
 Oscillation _____
 Multipass or Single Pass (per side) _____
 Single or Multiple Electrodes _____
 Other _____

PREHEAT (QW-406)

Preheat Temp _____
 Interpass Temp _____
 Other _____

This form may be obtained from The Order Dept. ASME 345 E 47th St. New York, N.Y. 10017

Figure 28-10-1 PQR Format - Page 1 of 2

QW-483 (Back)

Tensile Test (QW-150)

Specimen No.	Width	Thickness	Area	Ultimate Total Load lb	Ultimate Unit Stress psi	Character of Failure & Location

Guided Bend Tests (QW-160)

Type and Figure No.	Result

Toughness Tests (QW-170)

Specimen No.	Notch Location	Notch Type	Test Temp.	Impact Values	Lateral Exp.		Drop Weight	
					% Shear	Mils	Break	No Break

Fillet Weld Test (QW-180)

Result — Satisfactory Yes _____ No _____ Penetration into Parent Metal: Yes _____ No _____
 Macro—Results _____

Other Tests

Type of Test _____
 Deposit Analysis _____
 Other _____

Welder's Name _____ Clock No. _____ Stamp No. _____

Tests conducted by _____ Laboratory Test No. _____

We certify that the statements in this record are correct and that the test welds were prepared, welded and tested in accordance with the requirements of Section IX of the ASME Code.

Date _____ Manufacturer _____
 By _____

(Detail of record of tests are illustrative only and may be modified to conform to the type and number of tests required by the Code.)

Figure 28-10-1 PQR Format - Page 2 of 2

Welder and Welding Operator Performance Qualification Record

As described by Module 28-5, each welder and welding operator must be qualified. Documentation of their qualification is on the Welder and Welding Operator Performance Qualification Record. The qualifications are categorized as welder or welding operator dependent on the duties of the individual which are defined as follows:

- Welder - One who is capable of performing a manual or semi-automatic welding operation.
- Welding Operator - One who operates machine or automatic welding equipment.

As indicated by the above definitions, a welder is responsible for making necessary adjustment in welding parameters to maintain proper welding while welding operations are underway. Conversely, a welding operator sets up the equipment, starts and stops it, but makes no adjustments while welding is underway. Accordingly, more stringent requirements apply to qualification of the welder. However, the same record form is suitable for either.

Each qualified welder and welding operator is assigned a unique number, letter, or symbol which is used to identify the work by that person. The assigned identifier is entered on the person's qualification record. Also, the welding process and the WPS number is entered. These three entries permit cross-reference from work records to individual qualification records.

The Nuclear QA/QC Technician may be assigned any of the following tasks with respect to the Welder and Welding Operator Performance Qualification Record:

- Monitor qualification welding and enter welding data on the record.
- Monitor or audit the conduct of the qualification program including generation of the record.

- Monitor or audit welding operations to determine that each welder and welding operator is properly qualified.

The format suggested by the Code for this record is shown in Figure 28-10-2.

QW-484 MANUFACTURER'S RECORD OF WELDER OR WELDING OPERATOR QUALIFICATION TESTS
(See QW-301, Section IX, 1974 ASME Boiler and Pressure Vessel Code)

Welder Name _____ Check No. _____ Stamp No. _____
Welding Process _____ Type _____
In accordance with Welding Procedure Specification (WPS) _____
Backing (QW-402) _____
Material (QW-403) Spec. _____ to _____ of P No. _____ to P No. _____
Thickness _____ Die _____
Filler Metal (QW-404) Spec. No. _____ Class No. _____ F No. _____
Other _____
Position (QW-405) (1G, 4F, 5G, etc.) _____ % Composition _____
Gas (QW-406) Type _____
Electrical Characteristics (QW-409) Current _____ Polarity _____
Weld Progression (QW-410) _____
Other _____

For Information Only

Filler Metal Diameter and Trade Name _____
Submerged Arc Flux Trade Name _____
Gas Metal Arc Welding Shield Gas Trade Name _____

Guided Bend Test Results QW-462.2(a), QW-462.3(a), QW-462.3(b)

Type and Fig. No.	Result

Radiographic Test Results (QW-304 & QW-305)
F. alternative qualification of groove welds by radiography

Radiographic Results _____
Fillet Weld Test Results (See QW-462.4(a), QW-462.4(b))
Fracture Test (Describe the location, nature and size of any crack or tearing of the specimen) _____
Length and Per Cent of Defects _____ inches _____ %
Macro Test—Fusion _____
Appearance—Fillet Size (leg) _____ in. X _____ in. Convexity _____ in. or Concavity _____ in.

Test Conducted by _____ Laboratory—Test No. _____
We certify that the statements in this record are correct and that the test welds were prepared, welded and tested in accordance with the requirements of Sections IX of the ASME Code.

Organization _____
By _____
Date _____

(Detail of record of tests are illustrative only and may be modified to conform to the type and number of tests required by the Code.)
NOTE: Any essential variables in addition to those above shall be recorded.

This form may be obtained from the Order Dept., ASME, 345 E. 47th St., New York, N.Y. 10017

Figure 28-10-2 Welder & Welding Operator Performance Qualification Record Information

Nondestructive Examination Procedure Demonstration Record

Code work is subject to inspection by the Authorized Inspector. The Authorized Inspector is employed by an agency authorized by the state to enforce compliance with the Code. With regard to nondestructive examination (NDE) procedures, the Code stipulates requirements to be met by NDE procedures and requires demonstration of their use to the satisfaction of the Authorized Inspector. An approval signature block on the procedure constitutes the demonstration record once it has been signed by the Authorized Inspector.

Each NDE procedure is identifiable by number and revision. For example, MT-3.02, Revision 2, identifies a specific magnetic particle examination procedure.

The Nuclear QA/QC Technician may be assigned either of the following tasks with respect to the NDE procedure demonstration record:

- Coordinate company actions with the Authorized Inspector to arrange for demonstrations and obtaining approval signature by the Authorized Inspector.
- Monitor or audit NDE activities to confirm that only NDE procedures which have been signed by the Authorized Inspector are in use.

Nondestructive Examination Personnel Certification Record

Each person who performs NDE activities is required to be qualified. Three qualification levels are established as follows:

- NDE Level I - An NDE Level I individual is qualified to properly perform specific evaluations according to written instructions and to record the results.

- NDE Level II - An NDE Level II individual is qualified to set up and calibrate equipment and to interpret and evaluate results with respect to applicable codes, standards, and specifications. He or she must be thoroughly familiar with the scope and limitations of the method and shall exercise assigned responsibility for on-the-job training and guidance of trainees and NDE Level I personnel. He or she shall be responsible for the training and examination of NDE Level I and Level II personnel for certification.
- NDE Level III - An NDE Level III individual shall be capable of and responsible for establishing techniques; interpreting codes, standards and specifications; and designating the particular test method and technique to be used. He or she is responsible for the training and examination of NDE Level I and Level II personnel for certification.

The certification record for each level of qualification is typically comprised of a number of individual records. The records are identifiable by the person's name or assigned number, letter or symbol. While there is no special format for any of the records, the certification records must collectively contain the following:

- Name of certified individual.
- Level of certification and test method.
- Educational background and experience of certified individuals.
- Statement indicating satisfactory completion of training in accordance with the employer's written procedure.
- Results of the prescribed physical examination.

- Copies of current examinations and of grades for all previous examinations and descriptions of practical test objects.
- Percentile weights assigned to each examination if examinations were employed for qualification.
- Composite grade if examinations were employed.
- Date of certification and/or recertification and the dates of hire or assignment to NDE.
- Signature of certifying agency representative.

The Nuclear QA/QC Technician may be assigned either of the following tasks with respect to NDE personnel certification records:

- Monitor or audit the administration of the certification program.
- Monitor or audit NDE activities to confirm that NDE personnel are properly qualified to the correct level.

Certified Material Test Report

As described by Module 28-8, each lot or heat of filler material is certified by the supplier as meeting the requirements of the applicable material specification. The Code requires certification by a Certified Material Test Report which not only states that the material conforms with requirements but also gives values for the results of acceptance testing. Each report is identifiable by lot or heat number of the material represented.

The Nuclear QA/QC Technician may be assigned either of the following tasks with respect to Certified Material Test Reports:

- Review the reports to determine compliance with purchase order and material specification requirements.

- Participate in audits of the material supplier to determine that reports are supported by supplier practices.

Welder and Welding Operator Stamps or Weld Joint Record

As described in the foregoing section on welder and welding operator performance qualification records, each qualified welder and welding operator is assigned a unique identifying number, letter, or symbol. The code requires traceability from a weld joint to the welder or welding operator who made the weld by one of the following methods:

- Physical application of the welder's or welding operator's identification mark on or adjacent to the weld made by him or her. Such marking must be along the entire weld length at intervals of three feet or less. Blunt die stamps are typically used for this purpose.
- Preparation of a weld joint record which correlates each weld joint with the welder or welding operator who made the weld. This option may be employed for all welds or it may be used only for those welds where stamping is impractical.

When physical marking of the weld is employed, the person's assigned number, letter or symbol identifies who made the weld. As previously described, that person's qualification records are also identifiable by the assigned number, letter or symbol. However, another record is necessary to identify which WPS was used to make the weld. The "job package" instructions typically constitute this additional record.

When weld joint records are employed, the record is identifiable by entries for (a) system or component name or number and, (b) weld joint name or number. The record

identifies the WPS number and the welder or welding operator to indicate how the weld was made and by whom. A sample weld joint record is illustrated in Figure 28-10-3, courtesy of Niagara Mohawk Power Corporation.

The Nuclear QA/QC Technician may be assigned any of the following tasks with respect to welder and welding operator stamps and weld joint records:

- Monitor welding operations to confirm proper application to stamps or completion of weld joint records.
- Prepare weld joint records.
- Trace welders and welding operators identifying marks to corresponding qualification records to confirm use of qualified welders and welding operators.

NDE Inspection Reports

NDE inspection reports document the examination and acceptance of welds.

Except for radiography, special records formats are not typically used. Records of PT, MT, or UT examination typically consist of entries on other existing records such as the sequential processing instructions (job package), the weld joint record, or an inspection check list. Nonetheless, some companies use special formats for each of these NDE methods.

Radiography typically employs a special format even when entries are also made on sequential processing instructions or weld joint records. Unlike the other NDE methods whose results are interpreted as an integral step of conducting the NDE, the results of RT are not available until development and interpretation of the film. Therefore, an interpretation report serves to positively document the results of RT examination.

Regardless of format, each NDE record is identifiable to the weld, procedure and personnel by the following entries:

WELD HISTORY RECORD
NINE MILE POINT NUCLEAR STATION - UNIT 1

NAME OF SYSTEM _____		SYSTEM NO. _____	
DRAWING NO. _____		WELD NO. _____	
ISOMETRIC NO. _____		INDEX NO. _____	

WELD DATA (ROOT)	FIT UP (1)		
	METHOD & PROCEDURE NO.		
	PREHEAT TEMPERATURE		
	SHIELD PURGE		
	BACK PURGE		
	AMPERAGE		
	POLARITY (2)		
	FILLER MATERIAL		
	WELDER'S INITIALS & NO.		
	TEST (3)		
INSPECTOR'S SIGNATURE _____		DATE: _____	

WELD DATA (INTERMEDIATE & FINAL)	METHOD & PROCEDURE NO.		
	PREHEAT TEMPERATURE		
	INTERPASS TEMPERATURE		
	SHIELD PURGE		
	AMPERAGE		
	POLARITY (2)		
	FILLER MATERIAL		
	WELDER'S INITIALS & NO.		
TEST (3)			
INSPECTOR'S SIGNATURE _____		DATE: _____	

FABRICATION PIECE NO. _____ TO FABRICATION PIECE NO. _____
 PIPE SIZE (NOMINAL) _____ TO PIPE SIZE (NOMINAL) _____
 PIPE SCHEDULE _____ TO PIPE SCHEDULE _____
 ASTM _____ TO ASTM _____

(1) Type A-Butt
 B-Insert
 C-Socket
 D-Other (Name) _____

(2) Type A-DC Straight
 B-DC Reverse
 C-AC

(3) Type A-Visual
 B-PT Dye Penetrant
 C-MT Magnetic Particle
 D-RT Radiograph
 E-UT Ultrasonic

Figure 28-10-3 Sample Weld Joint Record

- System or component name or number
- Weld joint name or number
- NDE procedure number (for each method of NDE used)
- NDE person's name or identifiable number, letter or symbol (for each person conducting NDE and interpreting results thereof)

Sample RT interpretation reports are illustrated in Figures 28-10-4 and 28-10-5, courtesy of Niagara Mohawk Power Corporation and Industrial Testing Laboratory Services Corporation. Comparison of these formats reveals that the utility format identifies the RT procedure number while the test laboratory format has provision for listing all essential variables used in performing the RT. The testing laboratory format permits client approval of the RT procedure by approving the interpretation report, and thus, avoiding time delays for procedure approvals.

The Nuclear QA/QC Technician may be assigned any of the following tasks with respect to NDE records:

- Assist in developing NDE record's format and instruction for their use.
- Monitor or audit NDE activities to confirm proper completion of NDE records.
- Collect NDE reports, tabulate data, and analyze the data for trends in weld defect rates.

NIAGARA MOHAWK POWER CORPORATION
NMP-JAF NUCLEAR SITE
RADIOGRAPHIC INTERPRETATION REPORT

QCIR-77-679
NDE 5.00
CN Orig.
March 1977

Component or System CONTROL ROD DRIVE - 44.1		ISO/Drawing/Weld Map		Weld No. SEE BELOW		Date	
Supplier G & F		Code Section ASME VIII ASME III ☒ B-31 Other		Joint Design Backing Ring Insert Open ☒ Mat'l S/S		Job No.	
Stage of Mfg. COMPLETED						Radiographic Procedure(s) N10	
Radiographed By: (Co.) MTL						Casting Weldment ☒ Other	

Station Nos.	Weld	Accept	Reject	Root Concavity	Root Convexity	Cracks	Slag Incl.	Tungsten	Porosity	Incomp. Fusion	Undercut	Burn Thru	Oxidation	Surface Defects	Remarks
FW P44.1-16C	WELD #1														6-13-77
	0-1	✓													2.36 2.64
	1-2	✓						✓							FILM ARTIFACTS SCRATCHES
	2-3	✓													
	3-0	✓													FILM ARTIFACTS SCRATCHES
FW P44.1-16D	WELD #2														
	0-1	✓													FILM ARTIFACT / FILM ONLY
	1-2	✓													FILM ARTIFACTS
	2-3	✓													NEAR 2 CHECK FOR MIN. WALL
	3-0	✓													2-3 NO PROBLEM FILM CRIMPED
FW P44.1-16E	WELD #3														3-0 FILM ARTIFACTS
	0-1	✓						✓							
	1-2	✓						✓							
	2-3	✓						✓							
	3-0	✓													
FW P44.1-16-F	WELD #4														
	0-1	✓													
	1-2	✓	✓												ACCEPTABLE
	2-3	✓	✓												
	3-0	✓													
FW P-44.1-168	WELD #5														
	0-1		✓						✓	✓					6-13-77
	1-2	✓	✓												ACCEPTABLE
	2-3	✓													
	3-0	✓													SAME DEFECT 0-1

Gary Leskiw
Interpretation By:

III
NDE Level

6-13-77
Date

Figure 28-10-4 Radiographic Interpretation Report

PRODUCT CERTIFICATION

The ASME Boiler and Pressure Vessel Code requires certification of compliance with the Code for all work governed by the Code. A scheme of data reports is established for this purpose such that no matter how many contractors and subcontractors are involved, data reports flow with product movement until the owner of the nuclear power plant possesses all data reports. This scheme is illustrated in Figure 28-10-6 on the following page.

Certain welding records are always attached to any of the data reports listed in Figure 28-10-6. These are:

- Certified material test reports
- Nondestructive examination reports
- Actual radiographs where RT is performed
- Heat treatment records

The data reports and attached records are retained by the owner of the nuclear power plant or agent thereof, for the operational life of the product represented. Other welding records are retained by each company for a time period stipulated by the contractor for the product or services. A typical retention period is for two years after initial startup and operation of the nuclear power plant. Records generated during the operation of the plant are retained from one year to the life of the product dependent on the type of record.



EXERCISES

The following exercises serve to reinforce the information presented in this module. Answer each question based upon the material presented.

1. Discuss briefly why welding records need to be maintained and what document(s) stipulate that they need to be maintained and controlled.
2. What conditions are needed for a record to be of satisfactory quality?
3. Briefly explain the purpose(s) of each of the following:
 - a. Documents
 - b. Procedures
 - c. Record forms
4. Given any of the following records, state its purpose and describe how it is identifiable:
 - a. Procedure Qualification Records
 - b. Welder and Welding Operator Performance Qualification Record
 - c. Nondestructive Examination Procedure Demonstration Record
 - d. Nondestructive Examination Personnel Certification Record
 - e. Certified Material Test Report
 - f. Weld Joint Record
 - g. Nondestructive Examination Reprot
5. Given any of the records listed in #4 above, state two tasks which may be assigned to the Nuclear QA/QC Technician with respect to the record.



MATERIALS

None.



PROCEDURES

None.



DATA TABLE

None.



REFERENCE MATERIALS

American Society of Mechanical Engineers, Boiler and Pressure Vessel Code, Section III, V and IX, ASME, New York, New York

American Society for Nondestructive Testing, SNT-TC-1A Recommended Practices for NDE Personnel Qualifications, ASNT, Evanston, Illinois 60202



1. Matching - Match the following statements.

- _____ a. Quality Assurance Manual
- _____ b. Welding records
- _____ c. Welding Documents
- _____ d. Welding Procedures
- _____ e. Procedure Qualification Records (PQR)
- _____ f. NDE personnel certification records
- _____ g. Certified Material Test Reports
- _____ h. Welder and Welding Operator

- (1) serve to identify who made the weld.
- (2) describe responsibilities, duties, and methods of accomplishing welding activities.
- (3) serve to document the qualification of Welding Procedure Specifications (WPS).
- (4) document the level of qualification achieved by a person.
- (5) specify requirements to be met and include design or installation specifications and drawings.
- (6) this along with the applicable welding code stipulate what welding records need to be maintained.
- (7) includes documents, procedures and record forms.
- (8) attest to the quality of filler material and report actual results of acceptance testing.

2. Name three characteristics of records which represent record quality and discuss each in terms of factors which contribute to record quality.

3. A record is considered complete if all required entries are made. List three items which should be included in a record.
4. True - False - Place a T or F in front of the following statements denoting whether they are true or false.
- ☐ a. Welding records include documents, procedures and record forms.
 - ☐ b. Procedures attest to the quality of welds and qualification of personnel.
 - ☐ c. A record is complete if all required entries have been made.
 - ☐ d. A PQR is identifiable by its assigned unique serial number and its cross-reference with the (WPS).
 - ☐ e. The nuclear QA/QC technician may monitor or audit the welder qualification program and monitor or audit activities to confirm use of qualified welders and welding operators.
 - ☐ f. NDE personnel certification records document the level of qualification achieved by a person.
 - ☐ g. The nuclear QA/QC technician may review Certified Material Test Reports for acceptance and participate in audits of the material supplier.
 - ☐ h. NDE inspection reports serve to identify the person who made the weld.
 - ☐ i. Welding records which are forwarded with certified data reports to the owner are:
 - certified material test reports
 - nondestructive examination reports
 - actual radiographs where RT is performed
 - heat treatment records